Environmental assessment guideline for forest habitat of migratory birds

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Environment Canada
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Contents

Introduction

This guideline outlines an approach for assessing the environmental effects of development on the forest habitat of migratory birds. It has been developed for two main purposes.

First, it should assist proponents in identifying the types of information and the approach to impact analysis that Environment Canada would expect in an environmental impact statement (EIS) for projects that would affect the forest habitat of migratory birds. As such, it is intended to promote best practices for environmental assessment under the *Canadian Environmental Assessment Act* (CEAA), or when Environment Canada is involved in an environmental assessment of another jurisdiction. It is particularly suited to projects that impact forest habitat of migratory birds at the landscape level.

Second, it should assist forest companies in the development of sustainable forest management plans (FMPs) that provide an ecosystem-based approach to management of forest habitats for migratory birds. The demand for Environment Canada's involvement in FMPs either directly or in evaluating an EIS for an FMP has been increasing. This is a result of harmonization of environmental assessment processes in some provinces and because of Environment Canada's responsibility for and expertise in the protection of migratory birds.

This guideline identifies information requirements and analytical approaches for projects that may affect forest habitat at two scales: i) the stand level and ii) the landscape level. Therefore, requirements and analysis may at times be more appropriate to one or the other scale. Because there is more opportunity to mitigate effects of landscape-level forest manipulations, this guideline emphasizes migratory bird forest habitat considerations at the landscape level.

The guideline is predominantly conceptual in its approach: the emphasis is on principles rather than on providing a detailed checklist of information and analytical requirements for the EIS. It focuses on habitat needs of migratory birds in forests, needs which may not necessarily be consistent with those of other wildlife. Environment Canada recognizes the outcome of an environmental assessment will be a balance between the needs of migratory birds and other species in order to obtain broad biodiversity and sustainable development goals. Further, it is recognized that all the information identified in this guideline may not be readily available nor applicable to all projects, but in attempting to achieve best practices in environmental assessment it is necessary to identify state-of-the-art approaches to information requirements and

impact analyses. Information requests for EISs will therefore change through time as new information becomes available and science, environmental circumstances, and environmental assessment practices change. Therefore, the guideline should not be regarded as either exhaustive or restrictive, nor would it preclude requests for additional or different information for a particular project.

Background

The importance and vulnerability of migratory birds was recognized nationally and internationally as early as 1916 with the signing of the *Migratory Birds Convention* between the United States and Canada. In recent years, particular concern has arisen about migratory birds that depend on forests. This concern has resulted in the establishment of the Canadian Landbird Conservation Program (also known as Partners in Flight — Canada), the goal of which is to ensure the long-term viability of populations of native Canadian landbirds across the whole range of their habitats.

In Canada, most forest habitat has been allocated for logging. Forest Management Plans (FMPs) establish ground rules for forestry practices that affect large expanses of forested land. These practices and large-scale nonforestry projects in forested landscapes affect habitats of forest-dependent migratory birds. Also, logging or other types of projects on private lands in or near forests also affect migratory bird habitat. These pressures on forest bird habitat continue to grow. Environmental assessment of projects and participation in the development and review of environmental assessments for FMPs offer opportunities to assess the potential environmental effects of proposed projects and forestry practices on the habitat of migratory birds. These assessments should result in decision-making that minimizes disruption to migratory bird populations and their forest habitat.

The *Migratory Birds Convention* of 1916, which was implemented by the *Migratory Birds Convention Act* (MBCA) in 1917, provides for cooperation between Canada and the United States in the protection and management of migratory birds. A 1995 Protocol to amend the *Migratory Birds Convention* emphasizes the need to provide for and protect necessary habitat for the conservation of migratory birds. This is consistent with existing approaches, such as the establishment of Migratory Bird Sanctuaries pursuant to the MBCA and National Wildlife Areas pursuant to the *Canada Wildlife Act*. The *Canada Wildlife Act* also provides for coordination of wildlife programs and policies that involve birds not protected under the MBCA.

Maintaining healthy migratory bird populations and diversity in forest habitat requires an ecosystem approach to forest management that considers the interrelationships among wild species, wildlife habitats, and human activities. Several international and Canadian resource management policies are based on an ecosystem approach. For example, the *United Nations Convention on Biological Diversity* and the *Canadian Biodiversity Strategy* commit Canada to the conservation of biological diversity (including ecosystems) and sustainable use of biological resources. *A Wildlife Policy for Canada* defines wildlife as all wild organisms and their habitat. Together, they

address the need for integrated approaches to maintaining populations of wild species, biodiversity, and habitat, while maintaining human activities.

The *Convention on Biological Diversity* also addresses the application of environmental assessment to biodiversity. It identifies environmental assessment as a process that would help ensure that proposed projects are undertaken with a "view to avoiding or minimizing" significant adverse effects on biological diversity. The *Canadian Biodiversity Strategy* echoes the need for the use of environmental assessments to determine potential environmental effects on biodiversity, including ecosystems.

There is a distinct trend in forestry management towards sustainable forest management. Canada's national forest strategy, *Sustainable forests: a Canadian commitment* (1992) identifies the protection of ecosystem integrity and the maintenance of biodiversity as key prerequisites for sustainable forestry. The Canadian Standards Association (CSA) has developed a Standard for Sustainable Forest Management Systems that will "ensure that management objectives are set for the critical elements of the Canadian Council of Forest Ministers' criteria for sustainable forest management." Although use of the CSA standard is voluntary, it should prove to be a useful tool for managing forests, including their migratory bird habitats, in a sustainable fashion.

Information requirements

This section outlines both the contextual and specific information requirements that should be in an EIS addressing potential environmental effects of a project on forest habitat of migratory birds.

1. Context

The environmental assessment or FMP should be conducted in an ecosystem context. Although ecosystems are dynamic in nature, and changes are often the result of normal ecological processes, projects often cause changes outside the realm of natural variation, often at accelerated rates. As a result, the quality of birds' habitats or the birds' behaviour (e.g., selection or use of traditional staging areas) can be affected. Too radical changes could ultimately influence the survival of migratory birds. Therefore, baseline information needs and potential environmental effects of a proposed project should be determined by examining the likely effects of the proposed project on the migratory birds, the ecosystem (in particular their habitat), and the linkages between them.

In many situations the effects of a proposed project on habitat can provide a surrogate measure for the effects of a proposed project on migratory birds. The state of forest habitat may be able to serve as an indication of the health (e.g., abundance and diversity) of the total migratory bird population in an impact area. Assessing impacts on habitat may therefore facilitate impact assessment for proponents, because focusing on habitat will allow for reasonable impact prediction at times when it is difficult to collect adequate data on migratory birds themselves. Consequently, in this guideline many considerations used to assess environmental effects on migratory birds focus on habitat. However, other considerations may be equally or more important, and verification of the validity of forest habitat as an indicator of viable migratory bird populations and diversity, may be required (see Monitoring section).

The type of information required for forest habitats of migratory birds will largely depend on the scale of the proposed project or activity and the projected degree of impact (e.g., whether there are priority species or critical habitat used by birds that could be affected). In particular, requirements will vary depending on whether the project affects forest habitat at a landscape or regional level (e.g., often seen in FMPs or large-scale projects), or at a more local or stand level (e.g., a small-scale project or a small-scale FMP).

Quantification provides the basis for more accurate prediction of impacts and selection of mitigation measures, and facilitates objective monitoring. Therefore, during the planning and carrying out of an environmental assessment or the development of an FMP, particular attention should be paid to the collection and presentation of good, scientific baseline data where parameters that could be affected by the proposed project or FMP activities are quantified.

Disturbance to or destruction of critical habitat can lead to significant adverse environmental effects. Therefore, when gathering or compiling baseline information, proponents of projects should give special consideration to information related to forest habitat for priority species (for a description of priority species see *Migratory Birds Environmental Assessment Guideline* — Milko 1998a), species at risk listed by the Committee on the Status of

Endangered Wildlife in Canada (COSEWIC) species, or critical habitat requirements for any species of migratory bird. Critical habitat requirements will vary depending on the species and its specific life-history strategies and behavioural characteristics. For example, old trees and snags may be a critical habitat requirement for cavity-nesting birds; whereas an undisturbed riparian habitat may be a critical habitat requirement for other species. Qualitative aspects of habitat may also be important: for example, contamination of food sources can lead to reproductive impairments, and the removal of understory can reduce food sources.

Documentation about specific populations of migratory birds will vary by location. It may be hard to obtain adequate baseline information about migratory bird populations in especially remote areas, because relatively few censuses have been undertaken. In such cases, there are some basic principles regarding forests as habitat that, if followed, should provide general protection to migratory birds.

2. Guiding principles

Some guiding principles for environmental assessments and FMPs are listed below. They are most applicable where large areas will be logged, followed by the regeneration of trees.

- Ecological integrity of the regional forest's composition should be maintained or approximated. That is, the forest composition should approximate the composition produced by the natural disturbance regime for that region prior to recent human activities. This can be achieved by ensuring that the size, structure, and shape (when extensive landscape modification occurs) of stands and seral stages approximate that found in the regional landscape produced by the natural disturbance regime;
- Given that modifications of forest habitat will affect all birds (both year-round residents and migrants) that use the habitat, a conservative approach should be taken to disturbance of forest habitat. This is particularly important when there is a lack of adequate scientific, baseline information;
- All natural seral stages and forest habitat types should be represented in stands or tracts of the landscape in an undisturbed condition. This will assist in determining changes in forest habitats by providing control sites for monitoring purposes. Sizes of undisturbed forest will vary depending on the forest types, location, etc. (for an example see *Forest management guidelines to protect native biodiversity in the Fundy National Forest* — Woodley and Forbes 1997);
- Natural regeneration of trees and understory should be encouraged where possible, so that regeneration will most closely approximate natural stands or seral stages, thereby providing migratory bird habitat with all ecosystem components;
- Forest structure should be maintained;
- The loss of interior forest habitat and the amount of edge created should be minimized. At the same time, consideration should be given to any migratory bird species that require connectivity of forest habitat; and
- Wetland functions within the forest ecosystem should be maintained (see Environment Canada's *Wetlands environmental assessment guideline* — Milko 1998b — for wetland function information).

3. Specific information

Specific information requirements need to be determined in consultation with an environmental assessment practitioner of the local office of the Environmental Conservation Service of Environment Canada. However, the following information is generally needed for an

Photo: Robert Milko

understanding of the potential impacts of a proposed project or FMP on forest habitat of migratory birds.

- A complete project description including engineering details should be provided. This information should be provided or discussed at the earliest stage of planning to allow for modification of the project design prior to major commitments by the proponent.
- The geographic boundaries of the environmental effects of the proposed project must be identified (referred to hereafter as the "impact area"). This includes the affected forest habitats, bearing in mind the mobile nature of migratory birds, their varied habitat requirements, and their seasonal use of habitats. In the case of an FMP the impact area would generally be defined as the forest management area; however, when the implementation of an FMP would affect migratory bird habitat in the surrounding landscape, this should also be considered as the impact area. The impact area should be agreed to by the proponent and environmental assessment practitioners.
- A description of the potentially affected impact area will be required. The description should address the terrain, biological settings, and land use in the area. Particular attention should be paid to habitat requirements of the migratory birds in the impact area.
- Maps or GIS systems that accurately locate the impact area and baseline information should be provided at the same scale as the engineering plans (if relevant given the type of project proposal) to allow for overlaying of maps. Maps should contain UTM coordinates or other identifying parameters.
- The natural disturbance regime in the region in which the affected forest/stand(s) occur should be described. This should include frequency and type of the natural stand-initiating events (e.g., events such as fire, disease, insect infestation) that contribute to succession.
- The forest types should be described according to prevailing ecosystem site classification schemes or, if these are unavailable for that area, stand descriptions that include associated understory should be provided. The abundance of the different forest types relative to that found in the regional landscape should be described.

- Seral stages, habitat types or stands that provide particularly important habitat (e.g., they contain high abundance, high diversity, priority species, or species at risk relative to other similar areas in the regional landscape) should be identified and described.
- Forest habitat types in the impact area that have limited abundance in the regional landscape outside the impact area should be identified and described. Explain the reason(s) for this limited abundance.
- Habitat associations, including abundance and diversity of birds (by species and/or community) should be established. Describe other biodiversity components in the associations that could influence distribution or abundance of migratory birds. Examples are predators, brood parasites (e.g., cowbirds), and food sources.
- Because of their potentially important role for migratory birds, the following habitats in the impact area should be identified and evaluated in the context of bird habitat:
    - wetlands (also refer to *Wetlands environmental assessment guideline* — Milko 1998b)
    - riparian zone
    - post-rotational aged (old growth)
    - recent burn areas

- The degree of fragmentation resulting from human activity should be described.
- Species of migratory birds likely to be affected by the proposed project should be identified. Identify priority species.
- Identify species in the impact area that have limited abundance outside the impact area. Describe the reasons for this specificity or particular abundance in the impact area. For example, is it the result of biogeographic considerations or previous changes or impacts in the regional landscape outside the impact area?

Environmental effects

1. General considerations

Prior to consideration of any mitigation, a careful assessment of the environmental effects of the proposed project or FMP should be undertaken. The extent, both spatial and temporal, and the degree, quantified where possible, of the effects should be outlined in the environmental effects section of the EIS.

The types of factors that contribute to environmental effects will vary depending on the project type and the habitats that are potentially affected. Additionally, the effects will depend on the intensity, duration, timing, and frequency of impacts. Cumulative effects should also be considered. All the above should be incorporated into the analysis of impacts on the habitat and population dynamics of potentially affected species.

If the proponent undertakes to classify the effects (e.g., as negligible, minor, major, or significant), then explanations and justifications for the ranking system and designation of impacts should be presented. Quantification of environmental effects provides a good basis for determining the degree of impact. In particular, comparison to similar migratory bird habitats in the same or nearby similar landscape provides an opportunity to examine effects in a relative manner (see Monitoring section of this guideline.)

In more localized impact areas, particularly those undergoing a CEAA environmental assessment, information more specific to particular migratory bird species or communities may be required. (Please refer to Environment Canada's *Migratory birds environmental assessment guideline* — Milko 1998a.)

2. Specific considerations

After establishing the habitat associations of the migratory bird species with specific forest types, stands, or seral stages, the proponent should determine impacts that would result from the project or the FMP on the bird's

- abundance;
- density;
- distribution; and
- reproductive success.

Assessments prior to the modification of forest habitat must:

- differentiate environmental effects by individual bird species and bird community;
- consider the increased potential for predation and brood parasitism (e.g., due to increased edge effect and reduction of core area size);
- consider any quantitative or qualitative (e.g., contaminants, species shifts) changes to food sources;
- determine the degree of fragmentation of the forest habitat in terms of how species of the forest interior are affected (see Cumulative Effects section); and
- identify impacts that affect one species, more than one species, or entire communities.

The impacts should also consider disturbances such as:

- noise (i.e., frequency, duration, and intensity);
- structures that could become obstructions (e.g., hydro towers and lines);
- visual disturbances (e.g., lighting); and
- human activity.

3. Additional considerations for forest management plans

Post-logging stands with trees of particular age-classes do not necessarily provide the same habitat as natural successional stands of trees in similar age-classes. Forest habitat should be viewed as a functional ecosystem, including structure, understory vegetation, biodiversity, and food sources.

A model of the FMP should be provided. The FMP should include the information identified in the CSA *Sustainable Forest Management Plan* (see Appendix 1 to this Guideline). The model should show how closely the rotation age approximates the natural disturbance regime. The FMP should describe the age-class development in relation to seral stages in the unmanaged forest; particular attention should be paid to how closely the post-logging successional stands ressemble natural post-disturbance successional stages in terms of associated biodiversity, stand structure, and function. The model should incorporate natural stochastic events (e.g., fire, infestation).

If pesticides (e.g., insecticides or herbicides) are expected to be used, potential contamination problems associated with their use should be described.

4. Cumulative effects

CEAA specifically requires an environmental assessment to consider the cumulative environmental effects of a project. These are effects

> that are likely to result from the project in combination with other projects or activities that have been or will be carried out. (CEAA ss.16(1)(a))

The cumulative removal of forest habitat for projects or from logging will result in cumulative effects on migratory birds. In many situations, migratory bird populations in forest habitats have already been affected. Some species have threshold population levels below which reproductive capacity and immigration are not able to overcome

Photo: Corel.

stresses from adverse environmental effects. Cumulative fragmentation of forest habitat and increased edge effect in developed landscapes can result in significant nest predation, parasitism, and decreased reproductive success. Additionally, the effects of previous or other activities in the landscape should be considered when determining the cumulative effects on forest habitat of migratory birds.

There is particular concern when large expanses of the landscape are logged or slated to be logged (e.g., boreal forest). Cumulatively, the result is a net reduction in overall forest habitat, and the potential exists for significant reductions in bird populations or for eventual losses of whole bird communities associated with that type of habitat. Losses of communities may occur, for example, when post-rotational age-classes of trees or riparian habitats are allowed to disappear. In the case of FMPs, proper management should be able to retain all habitat types and bird communities in the same proportions as those found prior to logging.

5. Mitigation

Mitigation, is defined by the CEAA as follows:

> "mitigation" means, in respect of a project, the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.

The basic premise for any mitigation technique or strategy should be avoidance. The proponent should carefully consider the need for a particular component of the project or FMP that would affect migratory birds or their habitat. Relocating a project or activity under the FMP may provide the least disruptive approach. Consideration should be given to the timing of construction and/or project activities that contribute to disturbance. Activities should be avoided during critical periods of the migratory birds' lifecycles (e.g., nesting or staging). Failing adequate avoidance, mitigation techniques and strategies should focus on minimization of impacts.

Mitigation should be considered for each of the environmental effects predicted in the previous section. Although addressing each environmental effect individually is a good starting point, an understanding of mitigation techniques or strategies that take into consideration the complex nature of ecosystems is required. For example, using a nonnative species in restoration may affect the natural ecological balance in the community. Consideration should be given to the effects of the technique on nontarget species and their habitat. Care should also be taken to ensure that mitigation for migratory bird species does not compromise other wildlife, or that mitigation for other wildlife does not compromise migratory birds, important ecosystem components, or ecological processes.

The following information is oriented to the development of FMPs. Many of the mitigation concepts also apply to projects that have impacts at the stand level.

The development of a sustainable forest management plan that specifically accommodates migratory bird habitat requirements prior to the initiation of any logging activity is the best approach to mitigation.

A sustainable FMP has been outlined by the Canadian Standards Association, and this guideline enlarges on this outline from the point of view of sustaining migratory bird populations. Retaining a forest landscape that has age-classes whose structure, function, and size most closely approximate the full range of seral stages found under a natural disturbance regime is the key to maintaining the diversity of migratory birds that was found prior to logging.

To maintain migratory bird habitat in forests, a sustainable FMP or a plan to mitigate the effects of a project with impacts on forest must:

- minimize fragmentation and maintain interior forest habitat;
- maintain forest structure (e.g., understory vegetation, standing residual material, and downed woody material) in seral stages;
- use methods that promote natural regeneration in order to maintain forest structure, including understory vegetation;
- use silvicultural or other techniques that could, if necessary, enhance requirements of specific migratory birds (e.g., tree cavity nesters);
- use appropriate buffers for sensitive or unique habitats;
- maintain contiguous areas of uncut forest as control areas and reserves;
- time activities to reduce disturbance during critical periods of life cycles of migratory birds (e.g., nesting);
- log in winter to minimize road construction, particularly in areas with wetlands;
- ensure no net loss of wetland functions in forests (see Environment Canada's *Wetland environmental assessment guideline* — Milko 1998b).

6. Residual effects

The proponent should describe what environmental effects would remain after mitigative measures have been conducted. If attempts are made by the proponent to classify the effects (e.g., as negligible, minor, major, or significant), explanations and justifications for the designation of impacts should be presented.

Particular attention should be paid to residual effects, because they play a large role in the determination of whether the adverse environmental effects are acceptable or are significant enough to require mediation, panel review, or nonapproval.

Photo: Robert Milko

7. Monitoring

Monitoring regimes are needed to determine whether impacts are more than predicted, and to allow for appropriate changes in mitigative measures, if required. The proponent should describe proposed monitoring methods. Generally, they should conform to accepted monitoring practices for the different bird types, but particular methods may be requested by Environment Canada, depending on the specific situation and species in the impact area. For example, the *Canada landbird monitoring strategy* (Environment Canada 1994)

has been designed to monitor population changes of landbirds in undisturbed forest habitat and to describe species–habitat associations of forest birds.

For projects that could affect forest habitat at a landscape level, we recommend using both coarse and fine-grained approaches to monitoring migratory bird populations and diversity.

A fine-grained approach is needed to determine the abundance of species in forest of each post-logging age-class in previously logged areas. Particular attention should be paid to priority species, bearing in mind that these species may not be good indicators of population levels of other migratory birds. Verification of the relationships between priority species and the community may be requested, depending on local or regional circumstances.

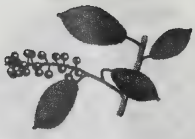
The coarse-grained or landscape approach uses changes in forest composition as an indicator of abundance and diversity of migratory birds. Because monitoring will, in part, take place in post-logging age-classes approximating seral stages, the relationship between post-logging age classes and natural seral stages of forests needs to be determined to provide confidence in this surrogate measure. Comparisons with migratory bird populations found in natural seral stages in the same landscape at the same time where other parameters are constant would provide a controlled approach to monitoring, and further the degree of confidence.

The degree of ground truthing for verification should be determined with the regional environmental assessment practitioner of the Environmental Conservation Service of Environment Canada.

The CSA standard for sustainable forests advocates adaptive management to determine whether a management plan is as sustainable as predicted. Managers need to predict changes, monitor and evaluate predictions, and adjust their activities to meet the original goals and values. The goal is, in this case, to maintain populations of migratory birds with a diversity and abundance as close as possible to those contained in the forest habitat prior to development.

8.) Methods

The EIS or FMP should clearly indicate the methods used to collect data and any existing information sources that were used in its preparation. The proponent may be required to justify the methods chosen. The proponent is encouraged to consult with the regional environmental assessment practitioner to determine what data may be available and to discuss appropriate methods for data collection.



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Appendix 1

How to create a sustainable forest management (SFM) plan (from Canadian Standards Association 1996)

A plan based on a long-term (see Clause 3.1) forecast shall be prepared for each Defined Forest Area (DFA) and revised at least every 10 years. The plan for each DFA shall include:

a) a summary of the results of activities for the previous planning period;

b) a statement of values, goals, and indicators;

c) a statement of management strategy;

d) a statement of management objectives for each indicator. Statements shall be quantified and have a predefined acceptable level of variance. A schedule for their achievement shall be provided, including benchmarks that can be audited;

e) current quantitative information for each indicator;

f) a description of the assumptions and analytic methods used for forecasting;

g) a description of the forest management activities to be undertaken;

h) an implementation schedule of sustainable forest management activities;

i) a monitoring procedure; and

j) a demonstration of the links between short-term operational plans and the SFM Plan

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